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NOTICE TO BRANCH SECRETARIES

We are endeavoring to have our mailing list correct and have recently made it correspond with lists received from Branch Secretaries and sent last month's REVIEW as per what we assumed was an up-to-date list, only to find that we had more REVIEWS returned, due to wrong address, than any previous issue. This is no doubt due to the fact that members have not informed their Branch when making change in their address, but have informed the Editor. In some cases the Editor had the correct address, and when changed to correspond with list furnished by Secretaries, an old and inaccurate address was the result.

MONTHLY REVIEW

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EDITORIAL

THE ZINC-CADMIUM DISCUSSION

In this issue of the REVIEW appear two articles that further discuss the merits or demerits of zinc vs. cadmium plating as a rust-preventive on steel, which, from the Editor's point of view, will end the discussion. We regret that some unpleasantness has been caused by the publication of these papers, for which the Editor takes no responsibility except the matter in this issue for reasons as follows:

The first paper was published in the June issue by previous Editor. The second, "A communication from the Udylite Process Co. to A. E. S. Convention," was ordered printed by vote of the Cincinnati Convention by unanimous vote, making every delegate responsible, since, if we remember correctly, there was no negative vote.

At the suggestion of the Editor, certain modifications were made in the second paper to omit personalities—this was complied with without protest, and in the papers in this issue we have insisted that personalities and matter foreign to the topic under discussion be left out.

We are of the opinion that one of the best methods of acquiring information is by hearing both sides of the question; too many people assume there are only two sides to any question, "our side" and the "wrong side."

The REVIEW should invite discussion on any topic dealing with the art and science of electro-plating, but must insist that in discussing these topics personalities and personal grievances can have no place, and feel sure that the members of the A. E. S. are in accord with a policy of this nature.

DISTRIBUTION OF CURRENT UPON A FLAT CATHODE IN A NICKEL PLATING SOLUTION

The experiments, the results of which are given in this paper, were prompted by a discussion of this subject at a meeting of the Newark Branch in April of this year.

It has been observed by all that if a flat piece of metal is used as a cathode and the current density gradually increased, the edges of the cathode will burn first, showing that the current density is greatest on the edges.

It was to determine the factors governing this unequal distribution of current that the following tests were conducted.

We will first describe the apparatus used in conducting these tests.

The cathode consisted of a plain sheet of brass, 5⅛" square, mounted on a piece of Bakelite. This brass cathode was divided into 25 pieces of 1" square, separated by 1/32". Electrical connections were made to each square, through a screw passing through the Bakelite, a wire being connected to each square inch. Each of these wires were connected to an ammeter shunt calibrated to be used with a milivoltmeter, so that one scale division would equal .0007 amperes, or .05 amperes per square foot, per scale division.

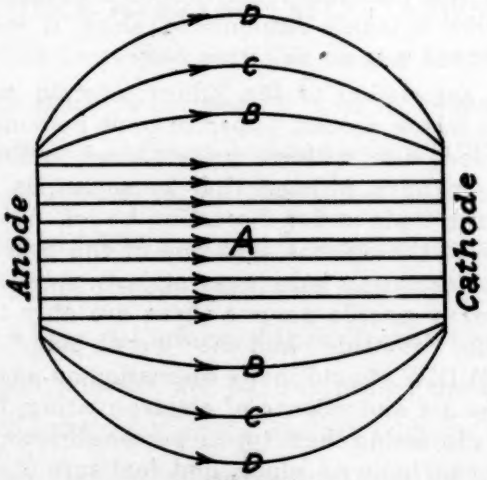

Fig. 1.

The tank was of the following dimensions: 9½" long; 6½" wide; 7" deep.

Experiments were started on the theory that the uneven distribution of current on a plain sheet cathode was due to the path of current through the electrolyte, other than the shortest path.

Current will flow via the paths "A," but it will also flow via the paths "B," "C" and "D." The flow of current through these various paths will be inversely proportional to their resistances.

If this theory is correct, then if all other paths were blocked off, except the shortest path, "A"—in other words —if the tank were made of the exact size of the cathode and anode, the current would distribute equally over the entire surface of the cathode. Bakelite plates were used as partitions, and the results are shown as follows:

3.85	4.	3.85	3.95	3.9
3.95	4.	3.85	3.85	3.85
4.	4.	3.85	4.	3.9
4.	4.	3.9	4.	4.
4.	4.	3.9	4.	4.

Fig. 2

These quantities are amperes per square foot.

It will be seen that each square inch receives practically

the same current, and that there is no real consistency in the small variations observed.

By determining the average density of each of these squares, and by determining the ratio of the minimum density to the average, we find in this case this ratio to be 97.8%, and the ratio of the maximum to the average, to be 101.5%. The ratio of the minimum to the maximum is 96%. Under ideal conditions this ratio would be 100%. In order to facilitate discussions, and to obviate the necessity of drawing the pattern as shown, for each test, we will use only this ratio of the minimum current density of the maximum current density, which we will call the distribution factor.

The next step was to move the partitions of the tank out, so that there was one-half inch clearance on either side, but no clearance on top and bottom, the tank being filled only level with the top of the cathode and anode. Under these conditions the current density increased on the outer edges and decreased in the middle. The ratio of the minimum to maximum, or the distribution factor was 85%. The partitions were moved still further out, and this factor reducing as follows:

No clearance	96%
½" "	85%
1" "	76%
2" "	63%
2¼" "	61%
2½" "	60%
2¾" "	59%

Cathode was then raised from the bottom of the tank, ¼", and the tank filled to ¼" over the top of the cathode. This top and bottom clearance was then increased to ½", and 1" with the following results:

2¾" clearance either side, ¼" top and bottom, distribution factor was 50%.

2¾" clearance either side, ½" top and bottom, distribution factor was 46%.

2¾" clearance either side, 1" top and bottom, distribution factor was 39.7.

I will now show you the typical pattern under these conditions:

8.25	5.5	5.25	5.5	8.4	32.90
6.2	3.8	3.6	3.8	6.4	23.80
6.	3.7	3.4	3.5	6.25	22.85
6.25	3.8	3.65	3.8	6.35	23.85
8.1	5.4	5.05	5.25	8.6	32.40
34.80	22.20	20.95	21.85	36.00	135.80

Total

Fig. No. 3

In this case the ratio of the minimum current density to the average is 63%. The ratio of the maximum to the average is 159%. The ratio of the minimum to the maximum is 39.7%.

The next test was to vary the current density, and to note the result upon the distribution factor. I might say that on all tests conducted where physical condition is a variable, the solution used was made up as follows:

8 oz. double nickel salts,
4 oz. single nickel salts,
4 oz. of epsom salts,
1 oz. boracic acid—per gallon of water.

Test run with the current density as a variable was conducted with an electrode distance of six inches and a temperature of 32 degrees C, with the following results:

Amperes per square foot	Distribution factor
3	42.5
6	40.5
9	38
12	37
15	36.5

The consistency of these results would lead us to draw the conculsion that the distribution improves slightly as the current density decreases.

The next test was run with the varying electrode distance, with the following results:

Electro distance	Distribution factor
6"	37
4½"	37
2¾"	38
2"	40
1½"	41.5
1¼"	43
1"	46

The conclusion from this test would be that the distribution factor improves with a decrease in the electrode distance.

The next test run was with the concentration of the solution as a variable. Full strength being equal to solution, made up as above:

Concentration	Distribution factor
Full strength	34.6
71%	33.7
51%	32.
37%	29.
26%	28.5

From this we would draw the conclusion that the distribution improves slightly with concentration of the solution.

The next test was run with temperature as a variable, with the following results:

Temperature	Distribution factor
25 degrees C	38
32 " "	38
35 " "	39
40 " "	39.4
45 " "	40
50 " "	40.3
55 " "	40.3

From these results we are prone to draw the conclusion that the distribution factor improves with increase in temperature.

The next test was run by building up a new solution, and by taking readings with the various amounts of ingredients, with the following results, solution consisting only of the ingredients shown:

Solutions	Distribution
2 oz. of single nickel salts	28.
4 oz. of single nickel salts	31.
4 oz. of single nickel salts 1 oz. of epsom salts	33.
4 oz. of single nickel salts 2 oz. of epsom salts	36.
4 oz. of single nickel salts 3 oz. of epsom salts	38.5
4 oz. of single nickel salts 3 oz. of epsom salts 8 oz. of double nickel salts	41.
4 oz. of single nickel salts 3 oz. of epsom salts 8 oz. of double nickel salts 1 oz. of boracic acid	39.5

The conclusion we reached from this was that the addition of either single nickel salts or double nickel salts, or epsom salts, improved the distribution, while the addition of boracic acid lowered the distribution factor.

In order to check this more carefully, another solution was made up and the following readings taken, with the addition of boracic acid:

No boracic acid	38
½ oz. boracic acid	37.5
1 oz. " "	36.5
1½ oz. " "	36.5

This checks with the results on the previous test, that distribution improves with decrease in the amount of boracic acid.

The next test was to determine the effect upon the distribution of the addition of common salt, with the following results:

NaCl	Distribution factor
None	38.
1 oz.	40.5
2 oz.	41.
3 oz.	41.5
4 oz.	42.5
5 oz.	44.
6 oz.	45.

Summarizing the results so far obtained we have:

1 as the free space around the cathode decreases.
2 as the current density decreases.
3 as the electrode distance decreases.
4 as the concentration of the solution increases.
5 with the addition of single nickel salts.
6 with the addition of double nickel salts.
7 with the addition of epsom salts.
8 with the addition of common salt.
9 as the temperature increases.
10 as the amount of boracic acid decreases.

We can group 4-5-6-7-8-9 into one class, and state that: The distribution improves as the conductivity of the solution increases.

Now, if we examine 2-3, and the last group, called conductivity, we will note that they have one common property at least, and that is a decrease in voltage.

Whether this is the deciding factor or not, I do not know, but see no reason why it should be.

The next test was to place the cathode at right angles with the anode, and in the middle of the tank, shown in figure No. 4 and the pattern as shown in figure No. 5:

This shows the distribution factor of 8.8%—or in other words—the squares nearest the anode, receive practically eleven times as much current as the squares farthest from the anode.

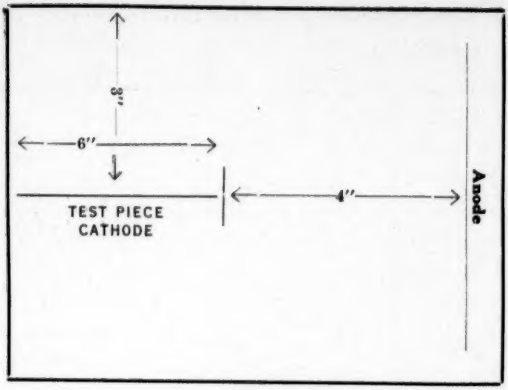

Fig. No. 4

2.1	1.5	1.65	3.3	4.85	13.3
1.75	1.2	1.8	2.45	4.4	13.4
1.70	1.2	1.55	2.45	4.4	13.7
1.5	1.2	1.6	2.5	4.4	13.2
2.7	1.25	1.7	2.5	4.5	13.7
3.0	2.5	4.0	4.25	6.7	13.6

Fig. No. 5

Cathode was then moved over from the side of the tank, as shown in figure No. 6:

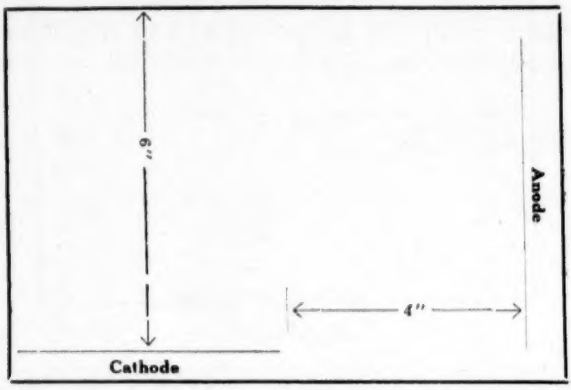

Fig. No. 6

which improves the distribution factor, increasing it to 16.

A three-sided test piece was made, consisting of the test piece as one side, and two pieces of brass as the other two sides, making the test piece bottom, as shown in figure No. 7:

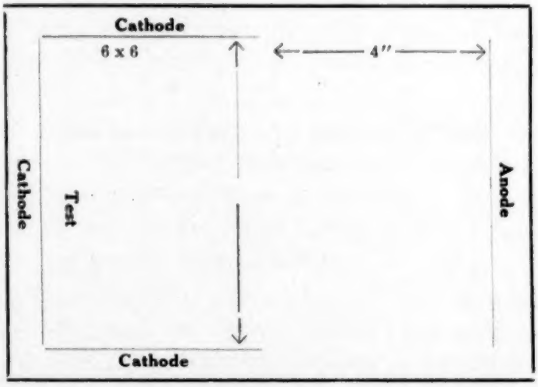

Fig. No. 7

pattern of which is shown in figure No. 8:

.3	.65	.8	.9	.7	.3
.35	.5	.1	.1	.55	.25
.3	.55	.95	.75	.5	.2
.2	.65	1.	.9	.45	.2
.2	.7	1.	1.	.5	.22
.2	.75	1.	1.	.75	.22

Fig. No. 8

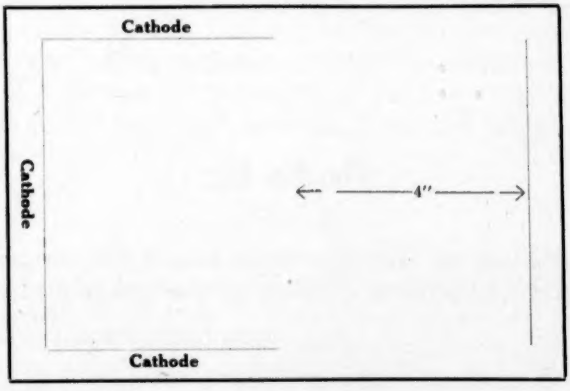

Fig. No. 9

The distribution on the bottom taken alone was 20%. The test piece was then used as the side, using figure No. 9:

with the pattern as shown in figure No. 10:

.4	1.	1.8	3.7	8.2	17.4
.55	.8	1.7	3.	6.6	17.5
.3	.85	1.7	3.7	5.5	18.
.3	.8	2.2	2.7	6.5	17.8
.3	.95	2.2	3.2	7.	16.5
.5	1.	2.2	3.8	7.	17.8

Fig. No. 10

The distribution on the side alone was 1.7%, or less than 2%. The distribution of current on the whole piece was as follows:

47% on either side, and 6% on the bottom.

The distribution constant on the three sides was 1.1%, or in other words, the edges near the anode, receive 90 times more current per square foot than the points in the corners.

These last four tests were run with no clearance top or bottom.

It, no doubt, will require a great deal more work and experimenting before we can tabulate the full facts on this question of current distribution, but we might tentatively use the results obtained in a practical way, by drawing what may be somewhat premature conclusions as follows:

The factor having the greatest effect upon the distribution is the amount of free electrolytic space around the cathode piece.

In order to improve the distribution, that is, to permit the use of higher current density on the part receiving the least current without burning the part receiving the greatest current, we would hang the pieces close together along the cathode rod if the surface is facing the anode and hang them far apart if the surface is at right angles to the anode. Hang the work so the top edge is just below the surface of the solution, and if convenient put a false bottom, which may be movable, which will shield the lower edge. The false bottom may be made in various forms to suit the character of the work.

One member of the society states that in plating shears with the point down he made a "V"-shaped trough which he hung directly under the cathode rod, letting the points of the shears hang in this trough. This shielded the points of the shears so they did not receive an excessive current density which they otherwise would have received.

I am sure that the ingenuity of the members will enable them to devise means of meeting their individual problems.

CORRECTION

Our former Secretary, J. E. Sterling, calls our attention to an error in printing of his report, page 12, August issue of REVIEW, as follows:

Total receipts should read	$3,358.17
Total disbursements should read	2,112.51
Balance	$1,245.66
Cash on hand and in bank, May 31, 1922	1,245.66

ELECTRO-DEPOSITION OF CADMIUM VERSUS ZINC

By Charles H. Proctor

A paper covering the above subject was read before the Newark, N. J., Branch of the American Electro-Platers' Society on Saturday afternoon, April 22, 1922, preceding the fourth annual banquet, at an educational session, and our esteemed editor, Mr. W. J. Allen, presumably thought the paper of sufficient interest to the members of the Society at large to print it in the MONTHLY REVIEW for June without any comment from the writer.

I have read with a great deal of interest the criticism of my paper by the Udylite Process Company, through their representative, Mr. C. H. Humphries, a member of the Indianapolis Branch.

If he had any knowledge of electro-plating under commercial conditions his eyes could certainly not be closed to the fact "That no commercial process of electro-plating can be successful when insoluble anodes are used in the process." I have explained the reasons why in my paper for this contention, I will however, elaborate further here.

The one commercial factor from any electro plating solution is metal. Cyanides, hydrates, chlorides or carbonates or any other salt that may be a part of the solution has no commercial value. If a plating solution, irrespective of the composition of the minor salts, is maintained exclusively in operation with metallic salts that exceeds in cost the price paid for the metal as anode per pound, then such a solution is not an economical solution and must reach a prohibitive stage, as I have outlined in my previous paper, when cost is considered as compared with the comparative value of cadmium and zinc as commercial rust-proof factors for iron and steel. Furthermore, such a solution must eventually fail to give the desired results if maintained in operation exclusively with metallic salts and insoluble anodes because only the metal is withdrawn and must be continually replaced to keep up cathode deposition.

When cadmium hydrate dissolved in sodium cyanide is constantly added to the bath such as in the solution the Udylite Company proposes, with carbon anodes, the metal is withdrawn faster than the sodium cyanide or sodium hydrate is decomposed. The results are that the solution must eventually build up with these salts so that deposition can only be carried on with difficulty and an ever increasing length of time must elapse to obtain a satisfactory thickness of deposit of metal.

To illustrate this contention under actual practice, the Udylite Process Company installed three two-hundred-gallon Udylite Process solutions in the City of R——, in Illinois. The solutions were intended for the deposition of cadmium upon steel refrigerator hinges as a basis for a rust-proof nickel deposit. There was more or less of a guarantee given that sufficient cadmium could be deposited in eight minutes on the steel hinges that would give a rust-proof coating after the cadmium deposit had been color buffed as a basis for the final nickel deposit.

The eight-minute deposit was possible the first day, the second day required twelve minutes, and more sodium cyanide and cadmium hydrate was added to replace the metal withdrawn. The fourth day required

fifteen minutes and so on. The day I was present in this plant thirty minutes were required to obtain the same thickness of deposit that was possible to obtain in eight minutes the first day the solution was in operation.

If 50% cadmium anodes had been used instead of insoluble carbon anodes and 50% insoluble anodes as hard rolled nickel anodes the rate of deposition obtained the first day could have been maintained by the addition of sodium cyanide only. If hard rolled steel anodes were used instead of nickel, the sodium cyanide and sodium hydrate would be regenerated to a certain extent and practically very little additions would be required to keep up an even rate of deposit from the solution.

Mr. Humphries is correct in the assumption that I could have elaborated quite considerably had I cared to do so in writing up my article. For his information I had reviewed Mather's and Marble's work entitled "Electro Deposition of Cadmium" in the transactions of the American Electrochemical Society, Volume 25, 1914, pages 297 to 333. If he had read Mather's and Marble's work carefully under cyanide solutions he would realize and understand that satisfactory results could be obtained from a number of cadmium cyanide solutions of varying compositions. Any member of the Society who desires to peruse the work of Mather and Marble included in the transactions of the American Electrochemical Society for 1914 can do so, for I shall be pleased to loan my copy of Volume 25, providing the postage is paid for transmission and return.

I again agree that my paper is not as complete from a mathematical standpoint as it might be, but I have proven what I started to prove, the comparative value of zinc and cadmium as commercial rust-proof factors for steel when based upon actual costs and results obtained at a price.

Mr. Humphries states further that "another point in favor of cadmium plating is the quicker time of plating owing to the high current density employed, etc." "This would mean increased output per unit equipment and decreased floor space. These have their values which should have been shown in Mr. Proctor's example."

The statements I have made concerning the Udylite solution in the City of R—— does not agree with Mr. Humphries' contention, that is, not with the Udylite Process, under commercial conditions, perhaps yes.

He further states another thing. Mr. Proctor reads from copies of the Udylite Patents that he has is the fact that insoluble anodes of cadmium are used. Mr. Humphries goes on to state, "If any member will take the trouble to examine the copies of the Udylite Patents Nos. 1,383,174-5-6, he will find that in these patents no mention is made of insoluble anodes at all." "In fact, it is specifically stated in each case that the anodes are metallic cadmium."

For Mr. Humphries' further information the statement I made was not in error regarding insoluble anodes, but intentional. I have gained the point I desired from Mr. Humphries. If the Udylite patents called for cadmium anodes, why were they not advocated instead of insoluble anodes? There is only one answer—financial return. The true patents so granted them for their protection are not being truly exploited with insoluble anodes, when the patents call for cadmium anodes. Some of

the members of the American Electro-Platers' Society who feel that they have paid an exorbitant price for a process that is not commercially practical with insoluble anodes should make claims for reimbursement on the basis of the patents and Mr. Humphries' contention that cadmium anodes were specifically mentioned to be used with the Udylite Process and no mention made of insoluble anodes.

I am of the opinion that the deposition of cadmium can be used to an advantage when cost is not a factor when used as a commercial process, as I have outlined in my paper as originally presented. When a very thin coating of metal is desired upon steel for a protective rust-proof coating then cadmium is no doubt the metal par excellence. As a basis for electro deposits of copper, bronze and brass upon steel when a more rust-proof finished article is desired then cadmium is an advantage, but all negative metals when deposited upon cadmium have the effect of reducing the rust-proof value of cadmium as a separate factor. Especially is this noticeable in nickel plating upon cadmium plated steel. A five-minute deposit of cadmium from the solution prescribed in my paper had not broken down, that is, shown rust, under 48 hours 5% continuous salt spray test when this answer was written. A similar plated article with a half-hour nickel deposit on top of the cadmium from an efficient nickel-plating solution broke down in 15 hours under the 5% salt-spray test. A similar nickel deposit direct upon steel broke down in two hours. These figures will show to some extent the value of cadmium.

If an article, however, made from steel is plated with cadmium and is under constant friction which reduces the protecting surface very quickly, then it would be more advantageous to plate the article with zinc, because at least five times as much zinc can be deposited as compared with cadmium for the same price. Zinc is harder and resists wear better than cadmium.

The advantage gained by heating the cadmium-plated steel is still problematical if a cadmium steel alloy is formed upon heating the steel articles so plated to a little below the melting temperature of cadmium. There would be little advantage in commercial deposition of cadmium by such heating owing to oxidation of the surface which would nearly all have to be cut away to produce a polished surface satisfactorily for bright finishes such as nickel, etc., or similar surfaces. Platers who have had to produce bright finished deposits upon a sherardized zinc base realize the difficulty such finishes entail.

Mr. Humphries goes into considerable detail to disprove the figures of cost I have given in my cost comparisons. He must concede that the figures he gives are for ideal conditions that can never result from solutions maintained with insoluble anodes by the Udylite Process. So far as the actual value of cadmium is concerned, as compared with zinc, reports I have in my possession from the Bureau of Standards and from commercial firms who have made comparative tests, prove that cadmium still remains in the cobalt class as compared with nickel.

If the cost of cadmium was 50% below present value it might be seriously considered for special purposes under actual commercial conditions.

I would again remind Mr. Humphries, so far as his personal contentions are concerned, that facts and figures in commercial operations are based upon the one factor, dollars and cents, as I outlined in my paper.

Mr. Humphries in his article made a number of sarcastic remarks against me personally, which, however, I absolutely ignored. I am content with what I have accomplished for the electro-plating industry in the United States, and still believe that whatever may come from my pen in the future will be read with as much interest as in the past.

ADVANTAGES OF CADMIUM PLATING OVER ZINC PLATING

C. H. Humphries

In a previous article, printed in the July issue of the MONTHLY REVIEW, as also in the one contained in the present issue, the real value of the Udylite Process has been entirely obscured by the statements which have arisen as to the relative cost of Cadmium plating, as applied by the Udylite Process Company, and the cost of zinc plating. The articles by Mr. Proctor have been based almost entirely upon the fact that Cadmium plating costs more than zinc plating, while at the same time he has not failed to point out that Cadmium plating is a better rust proof agent than zinc. The finishes, as obtained with Cadmium, are more beautiful than those obtained with zinc. They are more readily color buffed and nickeled than zinc plated articles. It is necessary to exercise only ordinary care in nickeling over the Cadmium finish, while nickel plating over zinc presents many di..culties and demands special solutions. I do not know of any other rust-proof finish which can be so readily nickel plated over than the Cadmium deposited by the Udylite Process.

The Udylite Process Company has never claimed, and does not claim, that Cadmium is cheaper, or as cheap, as zinc. It is understood that zinc plating is cheaper and there is no intention to compete with it in price.

Cadmium plating, as done by the Udylite Process, fills a field which zinc cannot touch. The very fact that Mr. Proctor shows by his own test that nickel over Cadmium will last at least seven times as long as nickel over steel is enough to warrant the future success of the Udylite Process. Understand, these are Mr. Proctor's own figures and, naturally, are very conservative. Our own results show that we get a life of from ten to twenty-five times the best nickel obtainable.

Mr. Proctor has also pointed out that the cost of plating, when replen'shing the baths with Cadmium salts, is more expensive than using Cadmium anodes. Obviously this is true and the Udylite Process Company realizes it. Even with this difference in cost, however, the cost of plating with a bath that is replenished with Cadmium salts is still commercial.

Cadmium anodes are not used because experience has shown that an

insoluble anode is better. Naturally the Udylite Process Company has protected itself in the use of both soluble and insoluble anodes, or a combination of the two. Combinations of Cadmium anodes and insoluble anodes might be used in some cases, just as Mr. Proctor suggests, but the Udylite Company is better satisfied with the results obtained by Udylite where insoluble anodes only are used and an excess of the Cadmium salts suspended in the solution.

Mr. Proctor further makes the statement that solutions cannot be maintained by the continual addition of Cadmium salts. This is a mistake upon Mr. Proctor's part. The Udylite Process Company has in use at the present time in their plant, and in their customers' plants, baths which have been in operation for over two years. They are working as successfully as the day they were started. It is true that the resistance of a Cadmium bath, so prepared and so maintained, will increase, but the limit of this increasing resistance is not out of a commercial range. This is owing to the fact that a fairly wide range of current density can be used, without materially changing the character of the deposit, and the conductivity of an old solution is still sufficiently great to enable it to handle the same size load when this conductivity has decreased to the minimum. Naturally the sodium hydrate contained in any bath will change in time to sodium carbonate, with a corresponding drop in conductivity. There comes a time, however, when a balance is reached and the amount of sodium hydrate contained in the bath becomes fairly constant. This balance is maintained by the continued gradual solution of the Cadmium Hydrate or Oxide, suspended in the bath. In a solution of the type which does not contain much free Sodium Cyanide, Cyanide additions are very infrequent and solutions have been maintained at a fairly constant metal content solely by using suspended Cadmium salts in this bath, without cyanide additions for months. In solutions containing much free cyanide there will be just the same condition in regard to accumulation of carbonates as is found in cyanide plating solutions of other metals running high in free cyanide. The working value of Cadmium solutions of this type, which have become rich in accumulated carbonates, has not decreased.

Mr. Proctor's statement that the Udylite Company installed three baths at a large manufacturing plant at R——, City of Illinois, is not correct. One solution only was installed, and it has worked so well that the company themselves increased their plant to three baths. This company has used the Process for one year and the Udylite Process Company has on no occasion been obliged to offer them any help.

If a bath is not properly maintained and the metal content is considerably lowered it is natural to expect that with a fixed load, owing to the decrease in conductivity, that a longer time will be necessary for obtaining a given thickness of coat. The maintenance of a bath is simple and it is entirely up to the individual plater to so maintain it. The Udylite Company, of course, does not control each individual solution that is in the various plants, but relies upon the plater there to maintain this as he would any other solution. Any plater is entirely competent to take charge of the bath after it is installed.

BRANCH NEWS

Detroit Branch

Detroit Branch held its regular monthly meeting Friday, October 6, in the absence of President O. H. Phelps, Vice-President B. E. Miller presided, and Ben proceeded to cause some of the members who were suffering from ennui, to sit up and take notice of the snappy way he handled the gavel. Minutes of previous meeting were read and filed.

Thomas Morgan as an active and Otto E. Gondy, associate, were duly elected members of the Detroit Branch, and we were certainly glad to have them with us. H. S. Brockway submitted saw test aluminum die cast handles nickel-plated that were fine.

Visitors were Chas. H. Procter, who, while attending the steel treating convention, visited various plants in this city. He praised the Detroit Branch for their chemistry study. No less noted a visitor was "Dad" Liscomb, who also was present at the convention and gave us a treat with his talk. The gem of the evening was the general discussion of plating problems, in which both Procter and Liscomb's varied and extensive knowledge was drawn upon by Ed. Lovering and others. The hour of adjournment was late, but was regretted by the following members: Messrs. Chas. Cequin, who is on the road to full recovery again; H. S. Lovering, L. P. Brockway, Kutzen, Flanagan, White, Shepherd, Stempin, Hartz, Goudy, Baldwin, Schultz, Wagner, Cunningham, Fritz, Miller, Woodmansee.

Rochester Branch

The last regular meeting of Rochester Branch was held at Hotel Seneca, Sept. 22, President S. P. Gartland presiding.

The most important subject up for discussion was how to make our meetings more interesting. As there was no definite action taken, Mr. Raymond Lopez consented to read a paper at our next meeting, which we hope to publish in the REVIEW.

Our annual outing was held at East Maplewood, Sept. 2. A very good program of sports, followed by dinner and dancing, had been arranged by the committee. As usual, the ball game was the most interesting part of the program, with S. P. Gartland starring for the old-timers in the pitcher's box, and Chas. Puffer doing the receiving.

The committee in charge of the outing was made up of the following members: H. C. Bernard, A. S. Groh, Geo. Hesselink.

Pittsburgh Branch

At our regular meeting of October 7, we received the application of Mr. W. F. Meyers, 518 Concord Avenue, Corry, Pa., for active membership. We held a very interesting meeting with a goodly number present, and had the pleasure of having with us Mr. J. L. Dinan of the Philadelphia Branch, who spoke to us at some length of the work that the Philadelphia Branch is doing.

It is to be hoped that from now on that most of our regular members will attend every meeting and make them as interesting as possible. Several good things are in store for them and should not be misssed.

Providence-Attleboro Branch

The Providence-Attleboro Branch has been holding some interesting meetings lately. Our chemistry class is not working this season as yet, but the get-together talks among the members makes a very interesting evening for those in attendance. Our Convention Committee is at work and the details of how to make a convention a success are being carefully studied.

Business has revived and many of the plants are working full time; in fact, quite a few are putting in overtime. Most all of us have our troubles, and many of our members would like to hear from the other branches in regard to a solution that will plate an acid-resisting metal of a white color. Most all colorers have some solution that will fill the bill to a certain extent, but what is required is a good, practical solution that will stand up to a test. The many combinations of gold, nickel, zinc, tin, etc., are being tried out in various ways, but we do not possess a good, reliable solution.

Question—What is the best method to strip silver from copper and leave metal bright and clean?

Question—What solution will deposit a good bright copper, fair thickness?

Question—What is the best means of obtaining a bright silver deposit?

We would like to hear from other branches in regard to their experience with tannic acid in silver solutions.

Our next meeting will be held Thursday, October 19, at 26 Custom House St., Providence, R. I.

Bridgeport Branch

Our first open meeting of the year was held on September 29, 1922, with one of the largest meetings this branch has ever had. They came from all over the State, which proves that our Speakers' Committee was on the job.

The meeting was opened by our live-wire President, John Slattery, who gave a very interesting talk on the aims of the Society, and why we should get more platers to join.

Mr. Stevenson of the Connecticut Valley Branch delivered the silver loving cup that the Bridgeport boys won at baseball at their sheep roast on September 23, 1922. This cup is to be played for each year until a branch has won it three times. The cup will no doubt stay in Bridgeport if the last game is any criterion.

We had short talks from the following: Messrs. Dunn, Hopkins, Lasher, Rice and Bernard. The surprise of the evening came when Mr. Hogaboon was called upon to give a demonstration of plating by wireless. He demonstrated the deposition of silver and copper by this method and was given a vote of thanks for his efforts.

A motion was made to have our regular meetings the first Friday in the month and our open meetings the third Friday. Our Speakers' Committee, namely, Geo. Karl and John Oberender, have a lot of surprises in store for the members who attend, and also have arranged to have some

of the biggest men in the science of electro-plating talk to us. So, be sure that you attend our open meetings, which are held the third Friday of each month.

Our regular meeting was held on October 13, with 22 members present. Our Secretary, Frank Spaine, has accepted a position out of town, we therefore elected Dave Fleming secretary pro tem.

A committee of past presidents was appointed, namely, Messrs. Dunn, Stratton and Bernard, to call upon the platers who are not members, to see if they will not join our branch.

Our Speakers' Committee was able to get Prof. L. W. Bahney to talk to us on October 20 on "Copper From the Mine to Ingot." Through the courtesy of the Singer Mfg. Co. they were able to get their recreation rooms, and from all reports we expect to have 300 attend.

This branch is setting a pace that keeps all members interested and on their toes, and a good deal of the pep is started by our president, John Slattery.

Several finishes were discussed, and we had remarks from Messrs. Dunn, Raull, Oberender, O'Niel and Flaherty.

Connecticut Valley Branch

Connecticut Valley Branch held its regular meeting on October 10, and in spite of unfavorable weather conditions, eleven members were present. One application for active membership was received. The Outing Committee reported the recent Waterbury-Connecticut Valley sheepbake a complete success in every way, and were given a vote of thanks for their work. It was decided to have an open meeting and smoker early in the winter and Messrs. Miller, Stephenson and Elwin were appointed a committee to make the arrangements.

Mr. Geo. B. Hogaboom then addressed the meeting on "Conductivity and Throwing Power," describing a series of experiments carried on at the Bureau of Standards over a period of fifteen months, with results that tend to upset the generally accepted idea of the relations of these factors in plating solutions. Mr. Hogaboom's talk was very much appreciated, especially so when it was learned that he had driven up from Bridgeport in the rain to attend this meeting.

Cincinnati Branch

The Cincinnati Branch, A. E. S., held its first monthly meeting on Friday, October 6, at the Y. M. C. A. Building, and was well attended. After the regular business the evening was given over to a talk on silver deposits. The Cincinnati Branch hereafter will hold its meetings at the Y. M. C. A. Building.

Cleveland Branch

Meeting of Cleveland Branch was attended by nearly two-thirds of the total membership as a result of a special effort to get members out, and made things interesting, along with some publicity. The discussion on nickeling aluminum was continued and this problem has developed so many cases of, now I have it, and now I haven't, the subject will be up

again at next meeting. Any branches or members having information on the commercial plating of nickel on aluminum please send to Secretary.

Chicago Branch

The regular monthly meeting of Chicago Branch was held Saturday, October 14, 1922, at Hardware Club, President W. G. Bott presiding, and all officers present except our Vice-President, J. Emmett, and for such a bad evening (it was raining) we had a very good attendance of the clan.

In addition to the clan we had with us Mr. Chas. Procter, who gave a very interesting talk on rust and corrosion, for which Chicago Branch members were very thankful. We also had with us Mr. W. McKeon of Pittsburgh Branch, who also spoke very interestingly to the clan, and when these visitors finished the President called attention to the fact we had with us two of our past presidents, who have not been down in a long time, Mr. Jas. H. Hall and Mr. H. G. Bender, of Racine, and these gentlemen promised more attendance in future.

The President then announced that time had arrived to prepare for our annual banquet, and on motion to have a banquet he appointed Mr. E. Lamoureaux chairman, R. J. Hazucha secretary of this committee of 12 members to start the ball arolling and report at November meeting what the prospects are for a humdinger of a banquet this year.

Owing to lateness of the evening the second paper of Mr. O. E. Servis' reading was laid over until November, with the permission of the members and reader.

Philadelphia Branch

The regular monthly meeting of Philadelphia Branch was held October 6, with President George Gehling in the chair, and twenty-seven members present.

One application was received.

The banquet committee reported that the eighth annual banquet will be held Saturday, November 25, in Mosebach's Hall, 1241 Girard avenue, with an open meeting at 3 o'clock.; banquet 7 P. M., followed with dancing, etc.

The speaker of the evening was Mr. D. Jacques Benoliel, whose subject was "Cleaners." This proved to be one of the livelist subjects we have had for some time, as many questions were asked by the members. Mr. Benolical was given a vote of thanks for his efforts in making the meeting interesting.

Dayton Branch

The regular monthly meeting of the Dayton Branch was well attended. After the usual course of business the educational part of the meeting was opened by a talk from Mr. M. G. Kopf, research engineer, describing and showing samples of several alloys obtained at the Detroit Convention of the American Society for Steel Treating, which he attended. Attention was called to the growing use of certain stainless alloys replacing nickel-plated products and the members were urged to make a study of these on account of the possible effect on their work.

Suggestions were made to originate alloy deposits equal to the stainless alloys in their properties in order to compete with this business. Cyanide products and a new cleaning process was mentioned as being applicable to the plating room. A plea was made for the electro-plater to keep abreast of the times and to do original work such that his business will be made valuable.

As part of the regular Question Box the suggestion was made that to overcome burning of a certain white metal casting the nickel solution be agitated by air and that after making certain the solution was neutral to add boric acid in place of citric. For a bronze casting job the use of an inexpensive varnish lacquer was discussed, in place of gun cotton products.

Much amusement was had when each member present was requested to relate an interesting incident in his experience, whether serious or comical. We learned some things we didn't know about some of our fellow members.

In the future it was decided to open all meetings after business discussions with at least fifteen minutes for questions or items of general interest.

The meeting closed with a surprise distribution of Mr. Kopf's booklet on Corrosion—its cause and prevention.

Newark Branch

Newark Branch A. E. S. held its regular meeting on October 6, with President O. J. Sizelove presiding, sixteen members and one visitor from N. Y. Branch attending.

The report of the laboratory committee was read and accepted. The application of Mr. Dressel and Mr. Lobash were laid over until their names were published in the REVIEW.

A motion, which was carried, that Newark Branch hold a banquet, with an afternoon "open educational session," about the same time as last years banquet, which would be near April 21, 1923. The banquet committee was appointed by the president as follows: Messrs. H. H. Smith, E. W. T. Faint, Chas. Piske, Royal F. Clark and Roy Stout. The committee is beginning early, as it intends to make the "afternoon educational session" one which will be exceptionally interesting.

Mr. Faint, our librarian, opened the discussions by exhibiting a steel rod about four inches long, which had been nickel-plated, and is to be inserted through a wood handle and then spun or turned over without having the nickel peel off. Suggestions of cadminum plating, zinc and tin were offered; also that the rod be made from some aluminum alloy.

Discussion on the production of the "Brush Brass" finish, with a dry composition, which enables the articles to be lacquered without any previous washing, was of interest. Mr. Pflomm, a visitor, from New York Branch, gave a few remarks when called upon.

Messrs. Sizelove, Bohler and Stout gave their method of using antimony sulphide as an oxidize on copper. Meeting adjourned at 10:30 P. M.

New York Branch

The regular meetings of New York Branch were held on Sept. 8, President Moringstar presiding, and on Sept. 22, Vice-President Wm. Fischer presiding.

Sept. 8 meeting papers were read and discussed on nickel-plating on a zinc deposit on steel bumper bars, separation of gold and platinum and rust-proofing steel. A zinc name plate was exhibited showing an intense black on the zinc, black produced by hanging in a black nickel solution without current, formulo of black nickel, 8z double nickel salts, 2 ozs. solim sulpho cyanide, 1 oz. zinc sulphate.

Question asked how to retain white lustre on articles as they leave the silver solution work to be lacquered. Wash in three clean hot waters to dissolve any cyanide on work; finish in alcohol work should be without a stain.

Sept. 22 meeting, nickel on aluminum was discussed. A member stated he cleaned his aluminum first by washing in gasoline, dry in sawdust, through a mild cleaner, pass through a nitric acid dip, nitric acid 50 parts, water 50 parts, until oxide is removed, rinse, then direct into nickel solution, strike, high then reduce current. Black nickel is deposited direct on the aluminum.

Connecticut Valley Branch

The Waterbury and Connecticut Valley Branches held their first outing and sheepbake on September 23, at Lake Compounce, Conn. This affair, which is to be held every year, was attended by more than one hundred platers, their wives and friends, from Connecticut, New York and Massachusetts.

After registration and a social hour in the Casino, the men adjorned to the ball field to battle for the baseball supremacy of the Connecticut platers. During the exciting game it was announced on the field by Mr. Hogaboom that E. M. Stephenson of Hartford would present a cup to the winning team, the cup to be known as the Stevie Cup, and this was to be played for at each outing. The game was won by Bridgeport, 11—3. Green hats were furnished the Bridgeport Branch and red to the Connecticut Valley Branch. The Waterbury and Bridgeport Branches formed a team to beat the Connecticut Valley Branch, but as the Bridgeport Branch had the most men on the winning team the cup will be given to their keeping until played for again. It was one of the most enjoyable outings in these parts, having such a large attendance and an ideal day. There were several prizes, both for the ladies and men, for all sorts of games, but owing to the lateness of the hour these games had to be called off and it was finally decided to distribute to the ladies a run of numbers and the prize won by number. The same was done to the men. We had a six-piece band, so there was dancing for the ladies and baseball for the men.

The monthly meeting of the Connecticut Valley Branch was held on Tuesday, September 12, at Hartford, Conn., with an attendance of ten members and three visitors.

In the absence of President Legate, the chair was occupied by Vice-President Vibberts. One new member was elcted and one was received by transfer from the Bridgeport Branch.

A convention committee, consisting of Messrs. Frank J. Clark and E. M. Stephenson, was appointed to work with the other New England Branches in preparing for the Providence Convention.

The outing committee of the Waterbury Branch was present at this meeting and final arrangements were made for the joint sheepbake to be held at Lake Compounce on Saturday, Sept. 23. This promises to be a very successful outing and a large attendance is expected.

The speaker of the evening was Mr. Robert Daybill, who told of a soap cleaner that he has developed that will remove grease and buffing compounds from any metal without tarnishing. Mr. Daybill's talk was supplemented by Mr. Hogaboom, who told of results obtained with a cleaner of similar composition. In conclusion a rising vote of thanks was given the speaker.

Any member who is interested in this compound can obtain further information by writing the secretary of this branch.

APPLICATIONS FOR MEMBERSHIP

Milwaukee Branch

Active, Martica Nishwitz.....1833 W. 6th St., Racine, Wis.
Active, Henry Heckenbach.....28 4th St., Fond du Lac, Wis.
Arthur Schmidt .....476 40th St., Milwaukee, Wis.

Detroit Branch

Associate, R. L. Shepard.....141 Montana W., Detroit, Mich.
Active, Carl W. Everly..... .....General Delivery, Saginaw, Mich.

Philadelphia Branch

Chas. Karl Mehl.....2201 N. 4th St., Philadelphia, Pa.

Newark Branch

Peter Labash.....268 Fairmont Ave., Newark, N. J.

Cleveland Branch

Harry T. Hopwood.....1613 East 75th St., Cleveland, O.

Connecticut Valley Branch

John H. Chomuley.....Care Aeolian Co., Meriden, Conn:

Chicago Branch

J. E. Miller .....215 W. Illinois St., Chicago, Ill.

ELECTED TO MEMBERSHIP

Detroit Branch

Associate, Otto E. Goudy.....311 Sims Ave., Wayne, Mich.
Active, Thos. Morgan.....642 Lincoln Ave., Detroit, Mich.
Associate, Guy H. Baldwin.....2309 McGraw Ave., Detroit, Mich.

St. Louis Branch

Active, Paul E. Miller.....1 N. First St., Evansville, Ind.

Pittsburgh Branch

Elmer J. Meyer.....Radium Plating Works, N. S., Pittsburgh, Pa.

TRANSFERRED

Active, Ira VanPelt.....From Indianapolis to Dayton Branch

BOSTON

Regular meetings are held third Friday of each month, at 8 p. m., at the American House, Boston. Secretary, A. W. Garrett, 821 Dorchester Ave., Dorchester, Mass. Mass.

BRIDGEPORT

Meets third Friday of each month in its laboratory, 260 John St., Bridgeport, Conn. Secretary, D. Fleming, Bridgeport, Conn.

CHICAGO

Meets second Saturday of each month, at 8 p. m., at the Hardware Club of Chicago, Room 1125. Secretary, F. J. Hanlon, 2921 George St., Chicago, Ill.

CINCINNATI

Meets on the first and third Friday of each month, at Y. M. C. A. Bldg. Secretary, W. J. Husing, 729 McMakin Ave., Cincinnati, Ohio.

CLEVELAND

Meets last Saturday of each month at Hotel Winton. Secretary, B. F. McCormick, 2024 Wyandotte Ave., Lakewood, O.

CONNECTICUT VALLEY

Meets on the second Tuesday of each month at 202 Washington St., Hartford, Conn. Secretary, Tennant Elwin, Newington, Conn.

DAYTON

Meets first Saturday of each month at the Y. M. C. A., Dayton, Ohio. Secretary, C. Van Derau, 61 Bish Ave., Dayton, Ohio.

DETROIT

Meets first Friday of each month at the Board of Commerce, Lafayette and Sheldon, at 8 p. m. Secretary, E. W. Woodmensee, 1427 Lee Place, Detroit, Mich.

GRAND RAPIDS

Meets on the second Wednesday of each month at the Vocational High School, 129 Bostwick Ave., N.E. Secretary, J. Andrew Warner, 738 Fairview Ave., N.E., Grand Rapids, Mich.

INDIANAPOLIS

Meets the second Saturday of each month at Hotel Denison. Secretary, Louis Mertz, 1725 Union St., Indianapolis, Ind.

MILWAUKEE

Meets second and fourth Thursdays of each month at the West Side Bank Bldg. Secretary, R. Steuernagel, 1508 Concordia Ave., Milwaukee, Wis.

MONTREAL

Secretary, A. Geroux, 48 Craig West, Montreal, Quebec, Canada.

NEWARK

Meets first and third Fridays of each month at No. 17 Central Ave., Newark, N. J., at 8 p. m. Secretary, Royal F. Clark, 71 Chadwick Avenue, Newark, N. J.

NEW YORK

Meets second and fourth Fridays of each month at the Broadway Central Hotel Parlors, New York City. Secretary, John E. Sterling, 468 Grand Ave., Long Island City, N. Y.

PHILADELPHIA

Meets first Friday of each month in the Harrison Laboratory Building, University of Pennsylvania, 34th and Spruce Sts. Secretary, P. Uhl, 2432 North 29th St., Philadelphia, Pa.

PITTSBURGH

Meets first Saturday of each month at 8 p. m., at United States Bureau of Mines Bldg., Forbes St. Secretary, S. E. Hedden, 227 Fifth St., Aspinwall, Pa.

PROVIDENCE-ATTLEBORO

Meets first and third Thursday of each month at 26 Custom House St., Room 16. Secretary, C. J. Poyton, 269 Ohio Ave., Providence, R. I.

READING

Meets on the second Tuesday of each month. Secretary, William M. Fisher, 654 Gordon St., Reading, Pa.

ROCHESTER

Meets every second and fourth Saturday of each month at the Hotel Seneca. Albert H. Doering, Secretary, 49 Cutler St., Rochester, N. Y.

SYRACUSE

Secretary, M. J. Crean, 109 Court St., Syracuse, N. Y.

ST. LOUIS

Meets first Tuesday of each month at Barr Branch Library, corner Jefferson and Lafayette Sts. Secretary, H. H. Williams, 4156 Botanical Ave., St. Louis, Mo.

TOLEDO

Meets first Thursday of each month at Toledo University Science Building, Electro-Platers' Room, corner Cherry and Page Sts. Secretary, Mr. Wm. Grob, 1317 Ewing St., Toledo, Ohio.

TORONTO

Meets second Thursday of each month at Occident Hall, Bathurst and Queen Sts. Secretary, E. S. Turner, 873 St. Clair Ave., Toronto, Ontario, Canada.

WATERBURY

Meets every second and fourth Friday of each month. Secretary, Wm. Delage, 47 Prospect St., Waterbury, Conn.